

reproduce these is determined upon. Now, if we had a dual mind, and if each hemisphere was capable of acting *per se*, then we should have each intellectual area sending a message to its own motor area, with the result that the two figures would be *distinct and correct*, not fused.

The other evidence that I referred to above, which is adduced in favour of the synchronously independent action of the two hemispheres, is from the account of such cases as the following. Prof. Ball, of Paris, records the instance of a young man who one morning heard himself addressed by name, and yet he could not see his interlocutor. He replied, however, and a conversation followed, in the course of which his ghostly visitant informed him that his name was M. Gabbage.

After this occurrence he frequently heard M. Gabbage speaking to him. Unfortunately M. Gabbage was always recommending him to perform very outrageous acts, such as to give an overdose of chlorodyne to a friend's child, and to jump out of a second-floor window. This led to the patient being kept under observation, and it was found that he was suffering from a one-sided hallucination.

Similar cases have been recorded in which disease of one sensory perceptive area has produced unilateral hallucination.

I cannot see that these cases in any way support the notion of the duality of the mind. On the contrary, they go to show that while as a rule the sensory perceptive areas are simultaneously engaged upon one object, it is still possible for one only to be stimulated, and for the mind to conclude that the information it receives in this unusual way must be supernatural, and at any rate proceeding from one side of the body.

To conclude, I have endeavoured to show that as a rule both cerebral hemispheres are engaged at once in the receiving and considering one idea. That under no circumstances can two ideas either be considered or acted upon attentively at the same moment. That therefore the brain is a single instrument.

It now appears to me that one is justified in suggesting that our ideas of our being single individuals is due entirely to this single action of the brain.

Laycock showed that the Ego was the sum of our experience, and every writer since confirms him. But our experience means (1) our perception of ideas transmitted and elaborated by the sensory paths of the brain; and (2) our consciousness of the acts we perform. If now these things are always single, the idea of the Ego surely must also be single.

THE FRENCH ASSOCIATION

THE fourteenth meeting of this Association has been held this year in Grenoble, one of the most intelligent and active French provincial cities, although it has not quite 25,000 inhabitants. It is situated on the banks of the Isère, one of the principal affluents of the Rhone, and is the head city of the Isère department.

The presidential address was delivered by M. Verneuil in the municipal gymnasium in the very hall where girls and boys are daily using horizontal and vertical bars. The actual President, M. Verneuil, is a surgeon in large practice, who delivered a long address on his profession under the title of "Confessions of a Surgeon of the Nineteenth Century." After having tried with much wit and force of expression to dispell prejudices current against practitioners, he went so far as to argue that operations are less frequent in France than in other lands, in spite of animal vivisection being free.

M. Napias, the general secretary, read a long paper on the scientific men who have died during the year, which has been singularly fatal to French science, and he announced the creation of a section of public hygiene and medicine. This section was inaugurated by an address of M. Chauveau, the Director of the Lyons Veterinary School, on the choleraic vaccination by Ferran. Not having been able to witness the operations conducted by Dr. Ferran, the referee was not in a position to give a definite opinion on this all-important matter; but he is satisfied that Dr. Ferran has adhered faithfully to the principles established by M. Pasteur. Although he may be assailed as lacking correct information on the biological part of the question, none of his assumptions can be considered as being in contradiction with well-stated and observed facts. It is probable that his method may be rendered less cumbrous and painful for the patients, but credit must be given to him for his daring experiments.

M. Galande, the treasurer, showed that the Association is possessed now of 20,000*fr.*, invested in public funds. The

amount of the annual subscriptions is 2250*fr.*, so it leaves a large surplus for the publishing of the transactions and encouragement given to science.

It was announced that the present meeting should have to vote on the fusion with the Association Française, which was created by Leverrier, and presided over by Milne-Edwards since the great astronomer died. No successor will be given to Milne-Edwards, as the two scientific bodies will unite.

The public lectures at the Sorbonne will continue, and a scientific paper will be started, issuing in fortnightly numbers.

M. Rey, the Maire of Grenoble, delivered a complimentary speech to the members of the Association, reminding them that Grenoble was the site of the first Marcel Deprez experiments after their short inauguration at Munich. The results of these important experiments now continuing between Creil and Paris are satisfactory.

In the section of anthropology M. de Mortillet discussed the question of Tertiary man. He said the question was not to know if man as he exists at the present day already existed in the Tertiary epoch. Animals certainly varied from one geological stratum to another, and these variations increased as the strata were geologically distant. The higher the animals the greater the variation. It was to be inferred then that man would vary more rapidly than the other mammals. The problem was not to discover existing man in the Tertiary period, but only to find there an ancestral form of man a predecessor of the man of historical times. The question was, Do there exist in the Tertiary strata objects which imply the existence of an intelligent being? M. de Mortillet has no hesitation in saying there do. These objects have, in fact, been found at two different stages of the Tertiary epoch—in the Lower Tertiary at Thenay, and in the Upper Tertiary, at Otta; in Portugal, and at Puy Courney, in Cantal. These objects proved that at these two epochs there existed in Europe animals acquainted with the use of fire, and able more or less to cut stone. During the Tertiary period there existed, then, animals less intelligent than existing man, but much more intelligent than existing apes. This animal, to which M. de Mortillet gives the name of *anthropo-pèthique*, or ape man, was, he maintains, an ancestral form of historic man, whose skeleton has not yet been discovered, but who has made himself known to us in the clearest manner by his works. A number of flints were exhibited from the strata in question, which had been intentionally chipped and exposed to fire. After a long discussion, the almost unanimous opinion was expressed "that after this meeting and discussion at Grenoble there can no longer be a doubt of the existence in the Tertiary period of an ancestral form of man!"

The sitting of the Sections took place in the Palace of the University (Faculties).

NORTH AMERICAN MUSEUMS

A REPORT has just been issued on a visit to the Museums of America and Canada, by V. Ball, M.A., F.R.S., Director of the Science and Art Museum, Dublin. Prof. Ball visited a large number of institutions in various parts of North America, and in his introduction says that he was impressed especially with the system, thoroughness, and good order which appeared to pervade the arrangements in the majority of these institutions. Many of them are of late growth, but already possess an astonishing degree of vigour, while their supporters and officers look forward in a spirit of great hopefulness to what must be described as gigantic extensions of their spheres of usefulness in the future. Largely dependent for their existence on the liberality of private individuals, they take what aid they can get from the Government, and it amounts, in the majority of cases, merely to State recognition. Those of them which possess directly educational functions claim an abundant harvest of good results, and there can be no doubt that the facilities which now exist for instruction in science and art are largely availed of in the principal cities of America.

Mr. Ball did not happen to come across, if such institutions exist, any which were in a condition of decadence from the apathy and indifference of those for whose benefit they had been established. On the contrary, several are unable, owing to their means or room being limited, to receive all the pupils who present themselves.

"That an interest in museums is largely felt in America is not only evidenced by the number of them which are scientifically conducted and the large number of persons who visit them, but it is also proved by the existence of commercially-conducted

museums, which are mere collections of curiosities; these are brought before the public in the true showman style, and there is reason for believing are often very profitable as speculations. The only one of these which I visited is the well-known "Museum" at Niagara Falls, which contains a varied collection of natural history and art objects. In a conversation with its manager, I learnt many amusing particulars as to its history. When I suggested to him getting casts of certain objects, he replied that it would not do for him to exhibit anything but the genuine articles to Americans."

The Smithsonian Institution was of course visited, and Mr. Ball sums up its functions thus:—

"The policy of the Smithsonian Institution is to initiate original plans for abstruse research, especially on lines not occupied by other organisations. It freely gives its publications and specimens without requiring an equivalent in return, and places its books, apparatus, and collections at the disposal of investigators and students in any part of the world. It has been the chief promoter of scientific exploration and investigation of the climate, products, and antiquities of the continent by the United States and State Governments, societies, and individuals."

Of the National Museum, Washington, we are told it is the authorised place of deposit for all objects of natural history, mineralogy, geology, archæology, ethnology, &c., belonging to the United States, or collected by the coast and interior surveys, or by any other parties for the Government of the United States, when no longer needed for investigations in progress.

The contents of the Museum as they now stand have been made up from the following sources:—

"I. The natural history and anthropological collections accumulated since 1850 by the efforts of the officers and correspondents of the Smithsonian Institution.

"II. The collections of the Wilkes' exploring expedition, Perry expedition to Japan, and other naval expeditions.

"III. The collections of the scientific officers of the Pacific Railroad Survey, the Mexican Boundary Survey, and of the surveys carried on by the engineer corps of the Army.

"IV. The collections of the United States Geological Surveys under the direction of the United States geologists, Messrs. Hayden, King, and Powell.

"V. The collections of the United States Fish Commission.

"VI. The gifts by foreign Governments to the Museum or to the President and public officers, who are forbidden to receive them personally.

"VII. The collections made by the United States to illustrate the animal and mineral resources, the fisheries, and the ethnology of the native races of the country on the occasion of the International Exhibition at Philadelphia in 1876, and the fishery collections displayed by the United States in the International Fishery Exhibition at Berlin in 1880.

"VIII. The collections given by the Governments of the several foreign nations, thirty in number, which participated in the Exhibition at Philadelphia.

"IX. The industrial collections given by numerous manufacturing and commercial houses of Europe and America at the time of the Philadelphia Exhibition and subsequently.

"X. The material received in exchange for duplicate specimens from the museums of Europe, Asia, and Australasia, and from numerous institutions in North and South America.

"The United States Geological Survey, under the direction of Major Powell, at present has its offices in the Museum, but they will shortly be removed to spacious quarters which are being provided for them in the city."

Of the Museum, &c., of the Academy of Natural Sciences, Philadelphia, Mr. Ball gives the following interesting account:—

"In a 'Summary History of the Academy,' by Dr. W. S. W. Ruschenberger, dated 1877, we are afforded a full insight into the origin and development of this, which is one of the oldest, if not the premier, society of the kind established in America.

"Its foundation originated in meetings held by a few Philadelphia gentlemen in the years 1811 and 1812. Its opening meeting took place on March 21, 1812, and its objects, as then defined were the pursuit and cultivation of science to the exclusion of everything of a political or sectarian character. It was apparently because of this last declaration that a considerable amount of hostility was excited in religious and other portions of the Philadelphia community. The small band, consisting of fourteen members and thirty-three correspondents, although they were men engaged in business avocations, diligently pursued the aims they had in view in spite of all opposition. Their library and

museum steadily augmented, and meetings were held and lectures delivered for the discussion and dissemination of scientific knowledge.

"After various vicissitudes during the troubled years which followed, several removals to more commodious quarters took place, and in 1826 the Academy moved to a building which had been specially prepared for its reception, where two years later it was enabled to throw open its museum, entrance to which, from that time, for forty-two years, or up to 1870, was free to the public for two days in each week. In 1840 the museum and library had again been removed to a building which had been specially constructed for their reception at the cost of several liberal friends of the Academy. Yet again in 1876 a further migration took place to the present building, which is built of brick, faced with green serpentine, as are also many other public buildings in Philadelphia; the style of the architecture is Collegiate Gothic. The museum building and the valuable collections which it contains owe their existence at the present day exclusively to the generous gifts and gratuitous labour of private individuals.

"The functions of the Academy are varied, owing to the different directions in which it operates. Its leading characteristics have been thus summed up: 'It is scientific because it encourages original investigations to the extent of its ability, and publishes whatever investigators may discover for the information of men of science. Its publications are made up entirely of the reported results of original research.

"'It is educational because it gives gratuitous instruction to the beneficiaries of the Jessup fund, and opens its library freely to students.

"'It is popular because it seeks to increase the taste for natural science, and spread knowledge by opening its Museum to the public.'

Recently the byelaws of the Academy have been modified in such a manner as to authorise the establishment of Professorships whenever endowments adequate to their support shall be made. Thirteen proposed Professorships are enumerated, and donations towards an endowment fund are invited which may yield from 1500 to 3000 dollars a year for each year.

"The library consists mainly of works on zoology and botany, but there is also a valuable collection of volumes on Roman, Greek, and French antiquities, and the collections of scientific periodicals of learned societies, which have been largely obtained in exchange for those of the Academy itself, is very rich. In 1876 the library included about 25,000 volumes, since which time it may be presumed that considerable additions have been made.

"Under the direction of the Council of the Academy, the Museum is at present administered by Dr. Leidy, who is assisted by several other Curators. The internal arrangements, owing to overcrowding and the old-fashioned form of the cases, which have not been replaced from want of necessary funds, does not at first sight commend itself as affording any useful hints with reference to the subject of general Museum arrangement; but the contents of many of these cases, as is well known to many men of science, are of great value, as they consist largely of types from which species have been originally described. Here, for instance, are to be found a portion of Gould's famous collection of humming birds, many of Dr. Lea's types of unios, and Dr. Leidy and Prof. Cope's fossil vertebrates. Among these last, most notable is the *Hadrosaurus*, an ideal restoration of which rears its lofty frame in a prominent position in the main gallery. More is now known as to the characteristics of those kangaroo-like reptiles (*Deinosaurs*) than was the case when Dr. Leidy named this one after its discoverer, Mr. Foulke. The ornithological collection, which is one of the largest in the world, contains, in addition to the humming-birds already mentioned, numerous rare specimens, one of them being the now extinct Great Awk, of which there is another example in the New York Museum of Natural History. The collection of shells which is under the custody of Mr. Tyron is renowned for its extent and value.

"The Herbarium is considered by good authorities to be one of the richest, if not the richest, in the United States. In 1876 it contained upwards of 46,000 species of plants. It was commenced in 1812, since which time it has absorbed many private collections, either given or bequeathed to it by their owners or purchased out of funds provided by friends of the Academy. Besides a general collection of minerals there is a special one which was bequeathed by the late Mr. Vaux, who also left a sum of money to provide an endowment fund for the payment

of the salary of a curator and for the acquisition of new specimens. This collection, so liberally provided for, includes many noble examples of rare minerals.

"The University of Pennsylvania possesses also a mineral cabinet which is administered by Dr. Genth, whose private collection is probably in some respects unique, especially as regards pseudomorphs and minerals which have been derived from others by alteration. Here it may be mentioned that in Philadelphia there are several important private collections of minerals which have been acquired at great expense by their owners—among them those of Dr. Lea and Mr. Bemment are especially noteworthy. However scientific institutions may have progressed in other parts of the United States of late years, Americans cannot but admit the debt which their country owes to the Academy of Natural Sciences for the leading part which it has taken for so many years in the advancement of knowledge of the natural sciences."

Mr. Ball gives a somewhat detailed account of the American Museum of Natural History, New York, which, however, we need not quote, as we recently referred to it in some detail.

The well-known Massachusetts Institute of Technology, Boston, was founded by charter in 1841, its objects, as sketched out by its first President, Prof. Rogers, being threefold, namely, the establishment of a Society of Arts, a Museum of Arts, and a School of Industrial Science. The Society of Arts was the first part of the scheme to be organised. It holds fortnightly meetings, from October to May, the objects of which are to "awaken and maintain an active interest in the practical sciences, and to aid generally in their advancement and development in connection with arts, agriculture, manufactures, and commerce." Discoveries and inventions are described and discussed at these meetings. Judging from the titles and characters of the subjects which have been communicated, the results of these meetings are often doubtless of such a character as to confer great benefit on the community at large. Abstracts of the proceedings are published in the annual reports.

In the new building a spacious and suitable hall has been provided for an Industrial Museum; but, although varied and valuable collections have been made of material suitable for such a Museum, it has been necessary to make use of them in the different departments of the school, where they are placed so as to be easy of access to teachers and students, which would not be the case were they centralised in the main building. The most important branch of the institution, Mr. Bull states, which has excited the admiration of so many visitors, is the School of Industrial Science.

This school was founded in 1865, and two subsidiary schools have since been organised under the control of the Corporation of the Institute. These are, respectively, the Lowell School of Practical Design and the School of Mechanic Arts. The studies in the school "are so arranged as to offer a practical and liberal education in preparation for active pursuits, as well as a thorough training for most of the active professions."

The regular courses, each of four years' duration, are as follows:—

- I. Civil and topographical engineering.
- II. Mechanical engineering.
- III. A. Mining engineering.
- III. B. Geology and mining.
- IV. Architecture.
- V. A.B.C. Chemistry.
- VI. Metallurgy.
- VII. A. Natural history.
- VII. B. Preparatory to the professional study of medicine.
- VIII. A. Physics.
- VIII. B. Electrical engineering.
- IX. A.B.C. General courses.

For proficiency in any one of these courses the degree of Bachelor in Science (S.B.), in the course pursued, is conferred.

The first six of these courses and VIII. B. are distinctly professional. The general courses IX. A.B.C. are for students who, though not desiring to enter a distinctly scientific profession, desire an education of a pre-eminently scientific character. Advanced courses of study may be pursued with or without reference to the higher degree of Doctor of Science. Women who are properly qualified are admitted to any of the courses of the school, and special laboratories in the different branches of study have been provided for their use. Schedules of prescribed studies in the various courses indicate very clearly the weight which is given to the modern languages and other branches of a liberal but strictly non-classical education.

The staff of professors and assistants is a large and highly competent one, and the practical part of the instruction appears to be carried on in a very earnest and sound manner. The fee for regular students is 400 dollars per annum, to which in estimating the total cost must be added board and lodging in the town, books, instruments, and personal expenditure. There are at present about 440 students on the roll. From the records of the School it would appear that numbers of its graduates occupy important positions all over the country, for which their special training has qualified them.

The School of Mechanic Arts is for the benefit of those who, from want of time or means, are unable to go through one of the regular courses of the School of Industrial Science. "The object is to develop the bodily and mental powers in harmony with each other." Its exact and systematic method affords the direct advantage of training the hand and the eye for accurate and efficient service with the greatest economy of time. The instruction in the mechanic arts given to each regular student at present embraces:—I. Carpentry and joinery; II. Wood turning; III. Pattern making; IV. Foundry work; V. Iron forging; VI. Vice work; VII. Machine tool work. The regular course includes two years of study in English, French, and elementary mathematics and physics. The general plan of the School is founded upon the systems followed in the Imperial Technical School of Moscow, the Royal Mechanical Art School of Komotan in Bohemia, the École Municipale d'Apprentis of Paris, and the Ambachts Schoole of the principal cities of Holland, modified, however, to suit local conditions. Applicants for entrance must be at least fifteen years old, and must pass an examination in arithmetic, geography, and composition. Fifty-six students have been on the roll during the current year.

The Lowell School of Practical Design was established by the trustees of the Lowell Institute for the purpose of promoting industrial art in the United States, but it is under the administration of the Corporation of the Institute of Technology. Tuition is free to all pupils. A considerable degree of skill in freehand drawing from nature and in the use of the brush is positively required for entrance to the school, which does not undertake to teach drawing.

"Course of Study.—Students are taught the art of making patterns for prints, gingham, delaines, silks, laces, paperhangings, carpets, oil-cloths, &c. The course is of three years' duration, and embraces (1) technical manipulations; (2) copying and variations of designs; (3) original designs or composition of patterns; (4) the making of working drawings and finishing of designs."

The school is provided with looms for different fabrics, and the pupils have the opportunity of working their designs in various materials. A constant supply of samples of novelties in textile fabrics of all kinds is received from Paris. Those students who, at the close of the half-year, do not show evidence of progress are permitted to withdraw. Some sixty students have received certificates from this school, and the majority of them have found employment in various factories and other places of business.

Among other institutions referred to in this Report are the Harvard Museum of Comparative Zoology, the Meteorological Museum, Harvard, the Peabody Museum, Connecticut, the Peter Redpath Museum, Montreal, and the Geological Museum, Ottawa. The Report is illustrated by numerous views and plans.

SCIENTIFIC SERIALS

Königliche Gesellschaft der Wissenschaften, Göttingen, January to March, 1885.—Memoir on Jacob Grimm, by F. Frensdorff.—On the optical properties of very thin metal plates, by W. Voigt.—Seventh annual report on the treatment of ear complaints in University Hospital, Göttingen, by Dr. K. Bürkner.—A contribution to the history of the Papacy during the tenth century, by Ludwig Weiland.—On the electric conductivity of liquid solutions in a state of extreme dilution, by Friedrich Kohlrausch.—On the Eris of Greek mythology, her outward appearance and representation in plastic art and literature, by Friedrich Wieseler.—On the theory of complex magnitudes formed of n units, by R. Dedekind.—The organic Aryan inflection of the locative case singular of the n declension, by A. Bezenberger.—On Euler's integral in connection with Cauchy's "Mémoire sur les Intégrales définies," by A. Enneper.—A demonstration of the multiplication theorem for the determinants, by M. Falk.—A